

# Rajarshi Shahu Mahavidyalaya, Latur

## ( Autonomous )

### Structured Work Plan for Teaching

(June – 2019 to October - 2019)

#### Details of Classes to be taught

Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	B.Sc. I	Dr.Vihang V.Patil	Biotechnology	Course Title: Cell Biology Course Code : U-CEB-187 Course Title:Lab Course I Course Code U-LA C-191

#### 1. Summary of Lesson Plan

Name of Teacher: Dr. Vihang V. Patil

Class : B.Sc. BT. I (First Semester)

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	Cell Biology	<b>UNIT I</b> Introduction Cell – Shapes, morphology, Cell theory, origin of life –Stanley miller Experiment. Origin of Mitochondria, Chloroplast, Coactivate Theory, Introduction to prokaryotic and eukaryotic cell, Microscopic techniques in cell biology.	24-06-19 To 20-07-19	03 01 01 02 01 02 01 02 02	Classroom Group Discussion	Unit – I 22/07/19
		<b>UNIT II</b> Biological membrane structure organization, membrane proteins, lipids.  Structure-function relationship including	21-07-19 To 18-08-19	03		Unit – II 19/08/19

		organelles(e.g., Cell wall ,Endoplasmic reticulum, Mitochondria, Chloroplast, Golgi body, nucleus and nuclear membrane, Microbodies: Glyoxysome, Peroxisome, Melanosome , lysosomes, vacuoles)		06		
		Cytoskeleton,		05		
		Extracellular matrix ,		03		
		Cell junctions.		02		
				01		
		<b>UNIT III</b> Membrane transport, Transport across cell membrane, simple diffusion, Passive transport, active transport, Na/K ion channel, vesicular transport, Concept of ETC Membrane Role of high energy compound. Membrane potential, Depolarization, hyperpolarization of membrane (neuronal). Generation of action potential. Types of biopotentials. Biopotential measurement instrument.	19-08-19 To 14-09-19	04 04 03 03 01 01		Unit – III 16/09/19
		<b>UNIT IV</b> The mechanism of cell division Cell division cycle and its regulation Cell Signalling; GProtein coupled receptor, Nitrous oxide, Calcium as secondary messenger and its role in plant and animals. Cell differentiation, Neoplasia & Cell death,	15-09-19 To 12-10-19	04 03 03 02 02		Unit IV 15/10/19

		Brief introduction to stem cells		03		
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Sr. No.	Subject	Practicals	Date	No. of Practicals
1	<b>Cell Biology</b>	Cell Diversity	01/07/19 To 24/10/19  Batch A,B,C,D,E,F	06
2		Separation of cells using sedimentation and velocity Centrifugation		06
3		Study of sub cellular organelles		06
4		Study of Karyotyping		06
5		Study of Mitosis, Meiosis		06
6		Cell harvesting and cell lysis- methodology		06
7		Immunoprecipitation		06
8		Demonstration of Antigen- Antibody reaction through clinical approach.		06
9		Preparation of blood smear and morphological study of different cells		06
10		Determination of cell density by turbidometer.		06
11		Study of Tissue by Microtomy		06
12		Study of osmosis		06

# Rajarshi Shahu Mahavidyalaya, Latur

## ( Autonomous )

### Structured Work Plan for Teaching

(December 2019 to March 2020)

#### Details of Classes to be taught

Sr. No.	Class	Name of Asst. Prof.	Subject	Paper
1	B.Sc. II	Dr. V V Patil	Biotechnology	Course Title: Process Biotechnology Course Code : U-PRB-499 Course Title: Lab Course XV Course Code: U-LAC-503
2	M.Sc. I			Course Title: Bioprocess Engineering Course Code:P-BIE-235 Course Title: Lab Course VIII Course Code: P-LAC-239

#### 1. Summary of Lesson Plan

Name of Teacher: Dr. Vihang V Patil

Class : B.Sc. BT. II (Third Semester)

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	Process Biotechnology	<b>Unit I</b> Introduction to Concepts of Bioprocess engineering:  1. Definition of Bioprocesses engineering. 2. Introduction to Simple engineering calculations, 3. Mass & Energy Balances. 04. Oxygen uptake rate (OUR), KLa, Viscosity & its control.  05. Design of Fermenters: Construction, Design & Operation, Materials of Constructions, Welding, Surface treatment Components of the fermenters & their specifications	10-12-19  To 27-12-19	01  02 02 03  06	Classroom  Group Discussion	Unit – I 27/12/20  Unit – II 16/01/20  Unit – III 20/02/20
		<b>Unit II</b> 1. Air & Media sterilization: Air Sterilization Principles, Mechanisms of capture of particles in Air, Depth & Screen Filters, Sizing, Testing & validation of filters for air Sterilization.		04		

		<p>2. Principles of Media Sterilization, Decimal reduction, Design of sterilization cycle using kinetics of thermal death of microbes Equipment used in sterilization;</p> <p>3. Constituents of media, Media Optimization their estimation &amp; quantification.</p> <p>4. Design of media, Costing of media</p>	<p>30-12-19 To 16-01-20</p>	<p>03  02  02</p>		
		<p><b>Unit III</b></p> <p>1. Types of Bioprocesses: Biotransformation (enzyme, whole cell), Batch, Fed-batch, continuous.</p> <p>2. Screening: Primary and Secondary Screening, Preservation and Maintenance methods for Microbial culture.</p> <p>3. Strain Improvement: Feed back Mechanism, Isolation of mutants which do not produce feedback inhibitors or repressors. Isolation of mutants which do not recognize presence of inhibitors or repressors. Modification of Permeability.</p>	<p>18-01-20 To 20-02-20</p>	<p>04  03  04</p>		
		<p><b>Unit IV</b></p> <p>1. Measurement &amp; Control of Bioprocesses Parameters: Cell growth. pH, temperature, Substrate consumption, product formation, Measurement of O<sub>2</sub>/CO<sub>2</sub> uptake, evolution.</p> <p>2. Specific rates of consumption substrate &amp; formation of product. Strategies for fermentation control. Foam &amp; its control.</p> <p>3. Computer controlled fermentations. Scale up in Bioprocesses fermentations, Factors used in scale up.</p>	<p>21-02-20 To 20-03-20</p>	<p>04  04  03</p>		

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Process Biotechnology	Isolation and Screening of Industrially important Microbes-Acid	16/12/19 to 31/03/20  Batch B,C,D	03
2		Isolation and Screening of Industrially important Microbes- Antibiotics		03
3		Isolation and Screening of Industrially important Microbes- Enzymes		03
4		Strain improvement		03
5		Sterilization Techniques		03
6		Maintenance of pure Culture		03
7		Growth Curve		03
8		Growth kinetics: Effect of pH & Temp		03
9		Media Formulation 8		03
10		Sterilizer Design- TDP, TDT		03
11		Cell and Enzyme immobilization		03
12		Visit to Fermentation Industry		03

**Course Teacher**

**Head**

Sr. No.	Class	Name of Asst. Prof.	Subject	Paper
1	B.Sc. II	Dr. V V Patil	Biotechnology	<b>Course Title: Process Biotechnology</b> <b>Course Code : U-PRB-499</b> <b>Course Title: Lab Course XV</b> <b>Course Code: U-LAC-503</b>
2	M.Sc. I			<b>Course Title: Bioprocess Engineering</b> <b>Course Code:P-BIE-235</b> <b>Course Title: Lab Course VIII</b> <b>Course Code: P-LAC-239</b>

Name of Teacher: Dr. Vihang V Patil

Class : M.Sc. BT. I (Second Semester)

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	Bioprocess Engineering	<b>Unit-I:</b> -Basic Chemical Engineering calculations. -Material balance. Material balance with reactions. Material balance with recycle and purge. Energy balance. Enthalpy, specific heat, mean specific heat. -Heat Balance. Heat of reaction and heat of solution. Material and Energy balance together.  -Fluid statics: Classification of fluids, concept of Reynold's number, Rheological properties of fermentation process (Viscosity, cell concentration, product concentration etc), Fluid mechanics.  -Potential flow. Newtonian and Non Newtonian fluid ( Bingham plastic, pseudo plastic, dilatants etc.), Heat and mass Transfer.	10-12-19 To 28-12-19	01  02  03  03  03	Classroom  Group Discussion	Unit – I 28-12-19 Unit – II 21-01-20 Unit –III 21-02-20
		<b>Unit-II:</b> -Fermenters: Ideal Properties of Bioreactor, Components of the fermenters & their specifications: Body Construction, Agitator, Impeller, Baffles etc.		04		

		<p>-Types of Bioreactors: (Packed-bed reactor, Air –lift, Trickle bed Photo bioreactors, Rotating Biological Reactors pneumatic)</p> <p>-Air &amp; Media sterilization : Air Sterilization Principles, Mechanisms of capture of particles in Air, Depth &amp; Screen Filters, Sizing, Testing &amp; validation of filters for air sterilization, Principle of Media Sterilization, Decimal reduction, Design of sterilization cycle using kinetics of thermal depth of microbes and Equipments used in sterilization: Batch &amp; Continuous</p> <p>-Quality Control, Quality assurance, Standard Operating Procedures (SOP) &amp; Good Manufacturing Practices (GMP).</p>	<p>30-12-19 To 21-01-20</p>	<p>04</p> <p>03</p> <p>02</p>		
		<p><b>Unit-III :</b></p> <p>-Media for large-scale processes &amp; their optimization: Constituents of media, their estimation &amp; quantification. Design of media. Costing of media.</p> <p>-Isolation, Screening, Preservations and maintenance of Microorganisms, strain improvement, Mutagenesis, Genetic Engineering for Strain Improvement. Development of inocula</p> <p>-Types of Bioprocesses: Biotransformations (enzyme, whole cell), Batch, Fed-batch, Cell recycle &amp; continuous fermentation processes.</p>	<p>22-01-20 To 21-02-20</p>	<p>04</p> <p>04</p> <p>03</p>		

		-Monod model & constitutive equations used for expressing growth, substrate consumption & product formation, Solid State fermentation		03		
		<p><b>Unit IV</b></p> <p>-Measurement &amp; Control of Bioprocesses Parameters: Cell growth. pH, temperature, Substrate consumption, product formation, Measurement of O<sub>2</sub>/CO<sub>2</sub> uptake, evolution. Specific rates of consumption substrate &amp; formation of product. Strategies for fermentation control.</p> <p>-Computer controlled fermentations, Foam &amp; its control. Scale up in Bioprocesses fermentations, Factors used in scale up</p> <p>-Downstream processing: Strategy for recovery, Harvesting of Biomass and Product, Removal of microbial cells and solid matter, foam separation, filtration, centrifugation, cell disruption, Liquid liquid extraction Ext, chromatography and membrane processes, Drying and Crystallization.</p> <p>-Bioprocess Economics, Choice of process, process analysis, fixes &amp; variable cost, Depreciation, Amortized costs, Selection of Pricing, Profitability, Scales of operations etc.</p>	22-02-20 To 20-03-20	05  02  05  04		

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Bioprocess	1. Media formulation and optimization	16/12/19 to 31/03/20  Batch A and B	02
2	Engineering	Study of Growth Kinetics of Bacteria and Yeast by turbidometry & SCP		04
3		Screening and maintenance of Industrially important microorganism- Acids, Antibiotics, Enzymes.		04
4		Study of scale up of fermentation		02
5		Study of design of bioreactor		02
6		Determination of TDP		02
7		Determination of TDT and design of sterilizer		02
8		Downstream process of industrial products (Intra & Extra cellular)		02
9		Problems based on: - Growth kinetics, fluid flow, Reynold's number		02
10		Visit to fermentation Industry		02

**Course Teacher**

**Head**